

Long-Term Surveillance and Maintenance Program

**Long-Term Surveillance Plan
for the
U.S. Department of Energy
Grand Junction, Colorado, Office Facility**

June 2001

Prepared by
U.S. Department of Energy
Grand Junction Office
Grand Junction, Colorado

Work Performed Under DOE Contract Number DE-AC13-96GJ87335
Task Order Number MAC 00-06
Document Number S0023100

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Appendix C—Field Photograph Log
Appendix D—Routine Site Inspection Checklist
Appendix E—Institutional Controls

1.0 Introduction

1.1 Purpose and Scope

This Long-Term Surveillance Plan (LTSP) is a technical plan that explains how the U.S. Department of Energy (DOE) will fulfill its stewardship obligation at the DOE Grand Junction Office (GJO) facility near Grand Junction, Colorado.

This LTSP addresses only that portion of the GJO facility transferred to non-federal ownership. This plan will be revised, as necessary, when other portions of the property are transferred to other entities.

This LTSP is in effect as of October 1, 2000. This LTSP will remain in effect until all identified hazardous materials for which DOE is responsible have been remediated to within regulatory limits and the site can be released for unrestricted use and unlimited exposure.

1.2 Legal and Regulatory Requirements

DOE holds title to and responsibility for the radioactive and other hazardous materials generated at the GJO facility prior to October 1, 2000.

DOE acquired the radioactive materials under authority of the Atomic Energy Act of 1954 (Public Law 83-703). Most of the radioactive materials consisted of uranium mill tailings, which are similar to materials regulated either as residual radioactive material under Title 40 *Code of Federal Regulations* Part 192 (40 CFR 192) or regulated as 11(e)(2) byproduct material under the Atomic Energy Act of 1954. Other radioactive materials at the GJO facility included refined uranium oxide (yellowcake) and incidental laboratory waste. Radioactive materials that were removed from the GJO facility were accepted for codisposal with Uranium Mill Tailings Radiation Control Act (UMTRCA) Program residual radioactive materials at the Grand Junction (also known as the Cheney), Colorado, Disposal Site, in accordance with the GJO facility Record of Decision (DOE 1989b). Some radioactive materials remain on the GJO facility and are managed by DOE.

Regulated nonradiological hazardous materials were removed and disposed of or managed as they were encountered.

The primary relevant and appropriate regulations and guidance for the remediation of the GJO facility are 40 CFR 192 and DOE Order 5400.5 (DOE 1989a and 1989b).¹ These regulations specify release limits for radium, uranium, and thorium in soil; radon concentration, surface contamination limits in structures; direct gamma exposure; and total effective dose. Site ground water is regulated under State of Colorado Title 5, *Code of Colorado Regulations*, Part 1002-8 (5 CCR 1002-8), "Basic Standards for Ground Water," including secondary drinking water and

¹ While GJO facility restoration was under the authority of the Surplus Facilities Management Program (SFMP), the standards conveyed in the *U.S. Department of Energy Guidelines for Residual Radioactive Material at Formerly Utilized Sites Remedial Action Program and Remote Surplus Facilities Management Program Sites* were found to be applicable. These guidelines were superseded by DOE Order 5400.5.

agricultural standards; 40 CFR 192; and risk-based limits specified by EPA Region 3. Site surface water is regulated under 5 CCR 1002-8, "Classifications and Numerical Standards for the Gunnison and Lower Dolores River Basins." Ground water standards are discussed in more detail in Section 3.6.1.

DOE conducted remediation of the GJO facility in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (CERCLA), as prescribed by DOE policy. A portion of this federal property was transferred to private ownership in accordance with applicable provisions of CERCLA Section 120(h). Some regulated materials remain on the GJO facility; these materials are managed by DOE. DOE responsibilities for this material are defined in Section 1.3, "Role of DOE." The nature of the contamination remaining on the GJO facility is described in Section 2.3, "Final GJO Facility Conditions."

In 2001, DOE sold a portion of the GJO facility to the Riverview Technology Corporation (RTC). A portion of the GJO facility will be transferred to the U.S. Army as early as 2001. DOE has certain obligations under CERCLA regarding transfer (conveyance) of this property to other entities because the property has a prior history of release and storage of hazardous substances. The following requirements were addressed in the sales contract between DOE and the RTC (DOE 2001e) and are made a part of the Deed (DOE 2001d):

1. DOE submitted information to the property recipient concerning (1) the type and quantity of hazardous substances that were known to have been released or disposed of or stored for 1 year or more on the property; (2) the time such disposal, release, or storage took place; and (3) a description of remedial action taken that was required under Section 120(h)(1) of CERCLA (42 U.S.C. § 9620(h)(3)(A)(i)).
2. DOE warranted that all remedial action necessary to protect human health and the environment had been taken or was in place before the date of the conveyance, with exceptions noted in the Deed.
3. DOE identified two areas where radioactive contamination remains, identified the protective controls in place to protect human health and the environment, and identified the remediation plan for these areas. These areas of deferred remediation are addressed in a CERCLA 120(h) request for deferred remediation to the State of Colorado.
4. DOE reserved a right of access to all portions of the property for environmental investigation, remediation, or other corrective action. This reservation includes the right of access to and use of available utilities at reasonable cost to DOE. These rights are exercisable in any case in which a remedial action, response action, or corrective action is found to be necessary after the date of the conveyance, or in which access is necessary to carry out a remedial action, response action, or corrective action on adjoining property. Pursuant to this reservation, the United States of America and its respective agencies, officers, agents, employees, contractors, and subcontractors shall have the right to enter upon the property and conduct investigations and surveys, to include drilling, borings, data and records compilations, and other activities related to environmental investigation; and to carry out remedial or removal actions as required or necessary, including but not limited to the

installation and operation of monitoring wells, pumping wells, and treatment facilities, and use of other actions deemed necessary by DOE to comply with all federal and state statutes, regulations, or any court order.

This LTSP adopts the approach outlined in the *Guidance for Implementing the Long-Term Surveillance Program for UMTRCA Title I and Title II Disposal Sites*, which defines the content of a site-specific LTSP and the general requirements for the long-term custody and care for a typical remediated uranium mill tailings site (DOE 2001a), as shown in [Tables 1-1](#) and [1-2](#).

Table 1-1. Requirements for the GJO Facility LTSP

Requirement ^a	Location in this LTSP
1. Legal description of site	Section 2.1
2. Description of final site conditions	Sections 2.3, 2.4, 2.5, 2.6, and 2.7
3. Description of the long-term surveillance program	Section 3.0
4. Criteria for follow-up inspections	Section 3.5.1
5. Criteria for maintenance and emergency measures	Section 3.6

^aThese requirements are specified in *Guidance for Implementing the Long-Term Surveillance Program for UMTRCA Title I and Title II Disposal Sites* (DOE 2001a)

Table 1-2. Requirements for the Long-Term Custodian at the GJO Facility

Requirement ^a	Location in this LTSP
1. Implementing changes to the LTSP	Section 3.1
2. DOE permanent right-of-entry	Sections 1.2 and 3.1

^aThese requirements are specified in *Guidance for Implementing the Long-Term Surveillance Program for UMTRCA Title I and Title II Disposal Sites* (DOE 2001a).

1.3 Role of DOE

In 1988, DOE designated the DOE-GJO as the program office for long-term surveillance and maintenance of all DOE remedial action sites, disposal sites, and other sites, as assigned, in order to establish a common office for the security, surveillance, monitoring, and maintenance of these sites. DOE established the Long-Term Surveillance and Maintenance (LTSM) Program at the GJO to carry out this responsibility.

Responsibility for stewardship of the GJO facility has been assigned to the LTSM Program. By extending long-term stewardship to the GJO facility, DOE ensures continuing protection of the public and the environment and ongoing regulatory compliance for this location.

The LTSM Program is responsible for the preparation, revision, and implementation of this LTSP, which includes procedures for site inspection, monitoring, and maintenance. The LTSM Program also is responsible for complying with reporting requirements and for maintaining records pertaining to this site.

DOE is responsible for managing contamination left on site after site transfer. These occurrences are described in Section 2.3, "Final GJO Facility Conditions." DOE will maintain protectiveness by adhering to the provisions described in Section 3, "Long-Term Stewardship Program." Stewardship activities include inspections, monitoring, and reporting, as described in that section.

As stipulated in the Request for Deferred Remediation (DOE 2001c), DOE will demolish and remediate the contaminated portion of Building 12 before DOE vacates the building and will remediate the contamination beneath Building 20 when that structure is abandoned. DOE has received approval to defer remediation of the regulated materials associated with the buildings, as provided for by State of Colorado Executive Order D013 98, "Evaluation of Requests for Transfer of Contaminated Property" and in accordance with CERCLA Section 120(h) (Colorado 2001).

2.0 Grand Junction Office Facility

2.1 Description of Site

2.1.1 Location and Property Ownership

The GJO facility is located at 2597 B 3/4 Road, Grand Junction, Colorado, approximately 0.6 miles (1.1 kilometers) from downtown Grand Junction ([Figure 2-1](#)). The property lies in Sections 26 and 27, Township 1 south, Range 1 west, Ute Principal Meridian, in Mesa County, Colorado. The GJO facility occupies approximately 54.17 acres (21.92 hectares) along the Gunnison River, which abuts the property on the north and west sides. Property adjacent to the east side of the GJO facility is owned by the Union Pacific Railroad; east of that is a city of Grand Junction municipal cemetery.

The property was acquired by the U.S. War Department in 1943, and subsequently was administered by the Atomic Energy Commission, the Energy Research and Development Administration, and DOE. In 2001, a portion of the property (46.20 acres or 18.70 hectares) was transferred to the RTC, a non-profit business development entity sponsored by Mesa County and the City of Grand Junction. The remainder of the property (7.97 acres or 3.23 hectares) will be transferred to the U.S. Army. This LTSP addresses only the portion of the GJO facility transferred to the RTC.

The legal description of the property is presented in [Appendix A](#) and shown on Plate 1. Real estate correspondence and instruments are maintained by the Property Management Branch, DOE Albuquerque Operations Office.

Directions to the site from Walker Field Airport, in Grand Junction, are presented in [Table 2-1](#).

Table 2-1. Directions and Mileage from Walker Field Airport to Site

Mileage	Route
0.0	At the Airport exit, turn left on to H Road
0.5	At traffic light, turn right on to Horizon Drive
5.3	At traffic light, turn left on to 7th Street
9.6	At traffic light, turn right on to Ute Avenue
10.0	At traffic light, turn left on to 5th Street
12.2	At traffic light, turn right on to Canon Street
12.7	Turn right on to B 3/4 Road, follow down hill to GJO Facility

The site is accessed from the east using B-3/4 Road, the only public road leading to the GJO facility ([Figure 2-1](#) and [Plate 1](#)).

The site is used for light industrial and commercial activities. Occupants include the Western Colorado Business Development Corporation Small Business Incubator and DOE, which operates an analytical laboratory and conducts project management and technical support operations at the site. Principal land uses in areas adjacent to and near the site include the municipal cemetery, agriculture, and gravel extraction. The closest residence is within 0.1 mile of the facility.

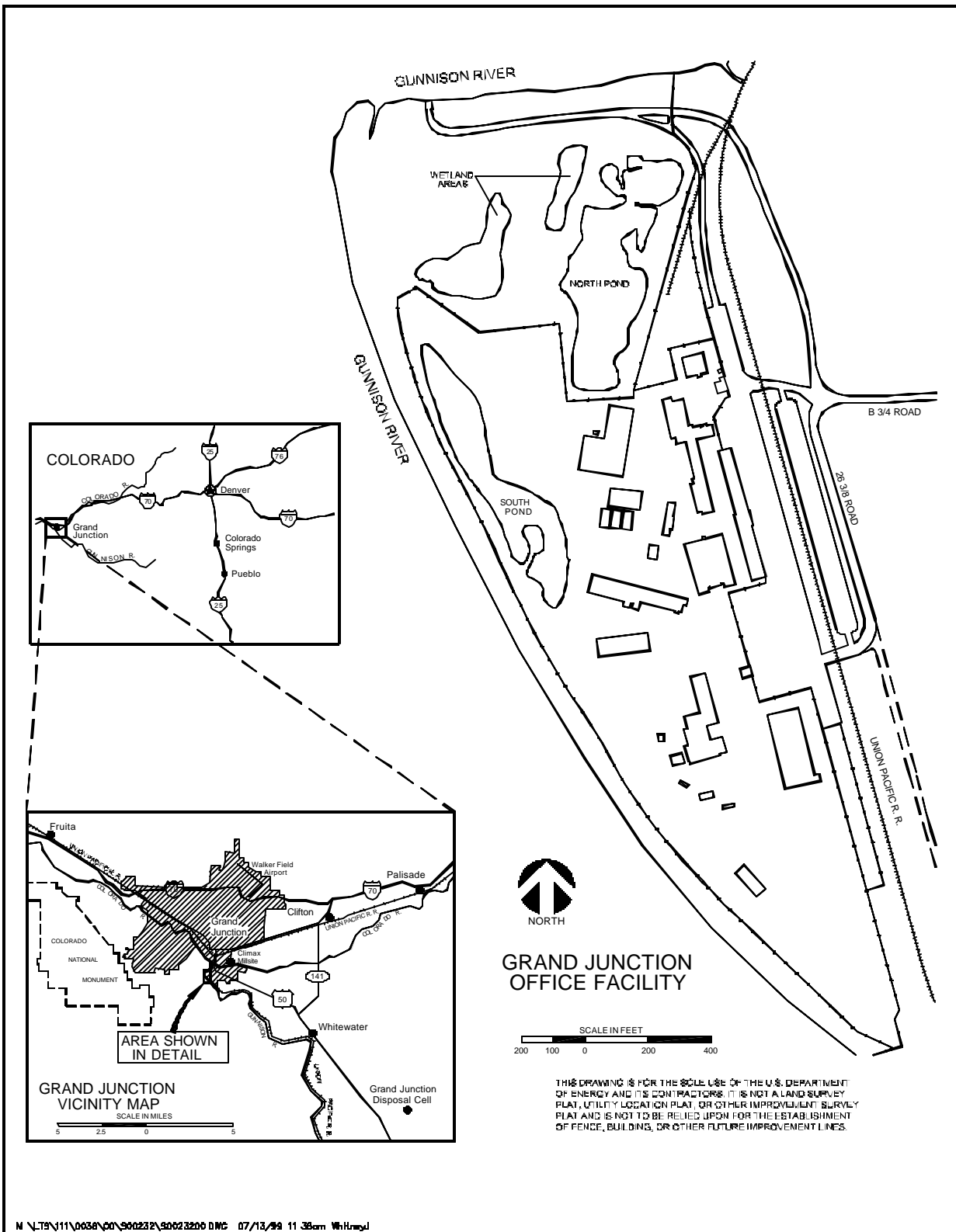


Figure 2-1. Location of the GJO Facility

Because of the earthen flood control dike, the GJO facility is considered to be out of the 100-year flood plain, but lies within the 1,000-year flood plain.

DOE-owned calibration models for borehole radiological measurements are located on the GJO facility. The LTSM Program controls access to and maintains these models.

2.1.2 Topography and Geology

The GJO facility is located in the Canyonlands portion of the Colorado Plateau physiographic province. Principal structural features in the area include the Grand Valley, which contains the Colorado River drainage; the Uncompahgre Plateau to the south, a broad uplifted area of sedimentary rocks and a Precambrian core; the Grand Mesa to the east, a basalt-capped sedimentary highland with elevations as high as 11,000 feet (3,353 m) above sea level; and the Book Cliffs to the north, an erosional escarpment that extends into Utah. The GJO facility is located at the boundary between the Grand Valley and the Uncompahgre Plateau. Elevation of the site is approximately 4,560 ft (1,390 m) above mean sea level.

The site is situated within an accretionary bend of the Gunnison River approximately 0.5 mile (800 m) up stream from its confluence with the Colorado River. At the GJO facility, the Gunnison River canyon is 1,500 to 2,200 feet (457 to 671 m) wide and 60 to 160 feet (18 to 49 m) deep. The Brushy Basin Member of the Morrison Formation and the overlying Burro Canyon Formation are exposed in the canyon walls. The strata at this location dip approximately 3 degrees northeast as part of local monoclines located at the north edge of the Uncompahgre uplift ([Figure 2-2](#)). Several small, local faults occur along the anticlinal hinge of these monoclines. Other faults occur in the sedimentary rocks adjacent to the GJO facility; these faults likely will not allow hydraulic communication with lower permeable strata because clays in the Morrison Formation will seal the fault planes.

Sandy loam soil at the site ranges in thickness from several inches to several feet. The soil is underlain by as much as 32 feet (9.8 m) of Quaternary river alluvium, which rests on top of Brushy Basin Member bedrock.

2.1.3 Hydrology

The alluvial sediments beneath the site comprise an unconfined aquifer consisting of two facies, a silty sand unit overlying a basal unit of poorly sorted, unconsolidated sands and gravels. These units are laterally consistent across the GJO facility. This aquifer is in direct hydraulic contact with the Gunnison River. The alluvial aquifer is bounded on the east by Brushy Basin Member silts, shales, and sandstones, and on the west and north by the Gunnison River ([Figure 2-3](#)). The alluvial aquifer continues up gradient along the east bank of the river. Brushy Basin strata beneath the alluvial sediments form an aquitard. Depth to ground water ranges from 5 to 10 feet (1.5 to 3 meters) over much of the GJO facility.

At the north end of the GJO facility, a portion of remediated land was not backfilled, resulting in a depression that is recharged by ground water. A portion of this area lays below the low-water level in the river and is inundated or saturated year-round, creating 1.45 acres (3.6 hectares) of jurisdictional wetland. Other portions of this area dry out during periods of low water.

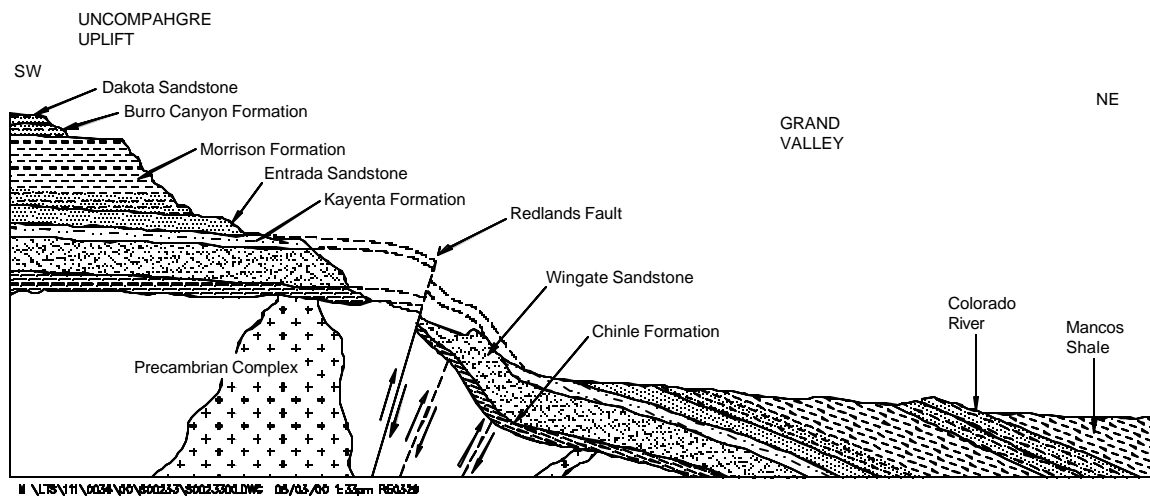


Figure 2-2. Geological Cross Section of the GJO Facility Region

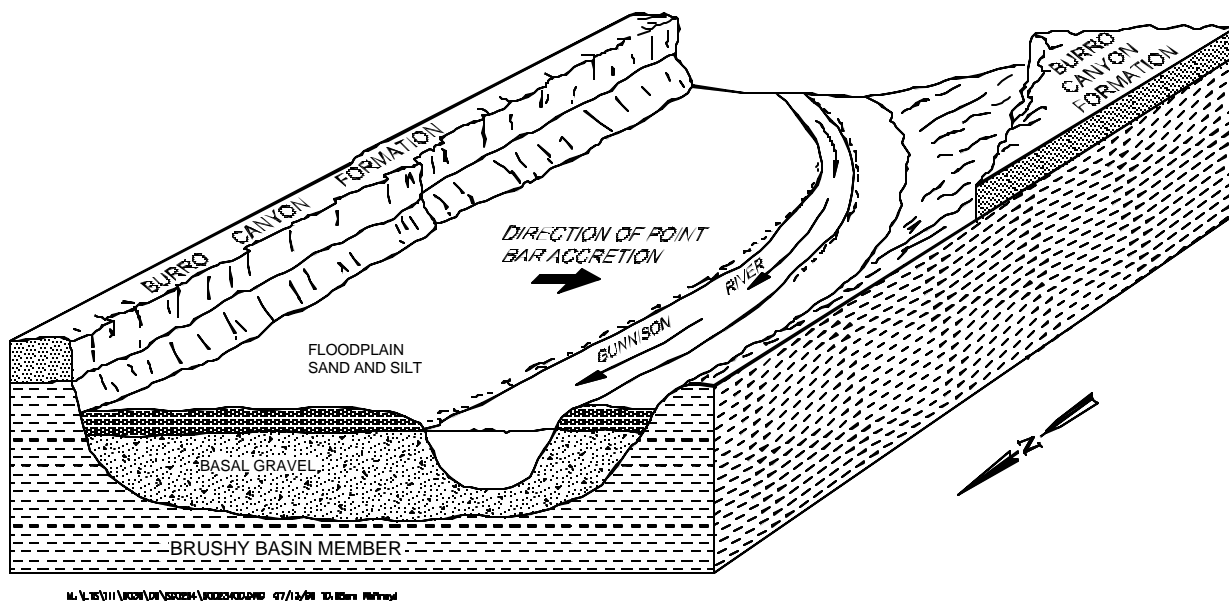


Figure 2-3. Block Diagram of the Hydrologic System at the GJO Facility

Aquifer pumping tests indicate that the alluvial aquifer has hydraulic conductivities ranging between 30 and 45 feet (9.1 and 13.7 meters) per day. Specific yield values of approximately 0.05 over a saturated thickness of 14 feet (4.3 meters) were determined by using pump tests. Water level measurements indicate that the general gradient is from south to north.

The aquifer was modeled during preparation of the Remedial Investigation (DOE 1989a). Field observations indicated that a simple depositional model would adequately represent the aquifer. The basal sands and gravels were deposited as the Gunnison River migrated from east to west. This process resulted in erosion of older alluvial sediments to the west and deposition of newer

sediments behind the river channel. The migration process resulted in a laterally consistent layer of imbricated gravel, sand, and silt. Periodic over-bank flooding resulted in deposition of finer sediments on top of the coarser channel fill deposits (Figure 2-3). The confining canyon walls caused swift flows, resulting in generally coarse, high-energy deposits of basal gravel.

The ground water flow regimen, as defined through observation and modeling, was used to predict contaminant fate and transport. The water level in the alluvial aquifer responds to the water level in the Gunnison River. River water levels fluctuate seasonally, reaching their highest levels in late spring as mountain snow melt in the upper watersheds feeds the river. Flow rates are lowest in late winter. This annual fluctuation results in a regular surging of ground water through the alluvial aquifer. As water levels rise in the spring, ground water levels increase at the north and west aquifer boundaries and move perpendicular to the river channel towards the center of the aquifer. As water levels in the river subside in the late summer, site ground water flow direction reverses and ground water discharges to the river. Ground water flow is generally northward during normal flow periods. Site drainage causes precipitation to flow into the South Pond and the North Pond, resulting in minor aquifer recharge.

2.1.4 Climate and Vegetation

The climate at the Grand Junction site is semiarid with about 8.8 in. (22.4 cm) of precipitation annually. Precipitation is characterized by brief, sometimes heavy, summer thunderstorms and light winter snowfalls. Winds measured at Walker Field Airport flow predominantly from east-southeast or northwest at an average velocity of approximately 5 miles per hour [2.5 meters per second (m/s)]; local topographical features influence wind direction. Temperatures range from average highs of 92 degrees Fahrenheit (33 degrees Celsius) in the summer to average lows of 16 degrees Fahrenheit (-9 degrees Celsius) in the winter.

Almost the entire GJO facility has been disturbed as a result of conducting remedial action, constructing improvements, or historical agricultural activities. Approximately 23.6 acres (9.6 hectares) of the 61.14-acre (24.74 hectare) site has been landscaped or is covered with gravel or asphalt. The unlandscaped areas have been revegetated with native and adapted species.

Riparian, wetland, and semiarid grassland plant ecology zones are present at the site. The riparian areas support cottonwood trees, silver buffaloberry, skunkbush sumac, willow, Russian olive, Siberian elm, and several grasses. Plant species in wetland areas include tamarisk, cattail, willow, sedge, bulrush, creeping spikerush, and alkali grass. The semiarid grassland vegetation is dominated by crested wheatgrass, inland saltgrass, Indian ricegrass, blue grama, galleta grass, and several perennial wildflowers.

2.2 Site History

2.2.1 Operations History

The GJO facility property was used for agriculture and gravel extraction prior to acquisition by the Federal Government.

DOE-GJO lands were acquired by the U.S. War Department in 1943 for use by the Manhattan Engineer District. A refinery was operated on the site from 1943 to 1946 to treat and concentrate uranium oxide, a byproduct of vanadium production in the area. As much as 2,360,000 pounds (1,070 metric tons) of uranium oxide and a comparable amount of vanadium oxide concentrate were produced and shipped off site for further processing. Wastes from this refinery included dust losses, a few hundred tons of alumina cake, and liquid discharges (DOE 1987).

In late 1947, the U.S. Atomic Energy Commission (AEC) established the Colorado Raw Materials Office on site to manage the domestic uranium procurement program. An exploration office also was located in the city of Grand Junction, which led to the combination of procurement and exploration functions within the AEC Grand Junction Operations Office. This office was responsible for receipt, sampling, and analysis of uranium and vanadium concentrates purchased from ore processing operations in the western United States. AEC operated a uranium-concentrate sampling plant and assay laboratory on site until 1974. Between 1948 and 1971, a total of approximately 345,000,000 pounds (16,000 metric tons) of uranium oxide and 29,000,000 pounds (13,200 metric tons) of vanadium oxide passed through the GJO facility in steel drums. The remaining stockpiled vanadium and uranium were shipped off site in 1967 and 1975, respectively (DOE 1987).

A research program to test experimental uranium-ore milling techniques was initiated at the GJO facility in 1953. Operations were conducted in a small pilot mill from 1953 to 1954 near the present location of Building 46. In 1954, a larger pilot mill commenced operations on the southern end of the property. Milling operations ceased in 1958, after approximately 30,000 tons (27,200 metric tons) of ore had been processed (DOE 1987). Most of the small pilot plant and the structures associated with the large pilot mill complex were demolished during remedial action.

The pilot milling operations were the primary source of contaminated materials buried at the GJO facility. Other potential sources of contamination include former laboratory and vehicle maintenance activities and activities related to sampling and stockpiling uranium oxide concentrates.

Surplus uranium ore, uranium mill tailings, and contaminated equipment were disposed of on site. Historical data indicated that tailings and other waste from the pilot mills and sampling plant were disposed of to the west of the original pilot plant (near Building 46) and in the vicinity of the large mill buildings. Nonhazardous waste materials were buried in the landfill area northwest of Building 7. The drains from the analytical laboratory discharged into the South Pond, and storm water runoff drained into the North Pond. An estimated 100,000 cubic yards (76,500 cubic meters) of tailings and contaminated soils were stabilized on site, and another 300 cubic yards (230 cubic meters) of contaminated process equipment was buried at the GJO facility. Nearly 18 acres (7 hectares) of the GJO facility was assessed as contaminated. Leaching of stockpiled and buried tailings resulted in ground water contamination.

2.2.2 Remedial Action History

The GJO facility was accepted into the Surplus Facilities Management Program (SFMP) in 1984. In 1988, the facility was transferred to the Defense Decontamination and Decommissioning

(D&D) Program. In 1990, remediation authority and responsibility for the site was transferred to the DOE Office of Environmental Restoration.

Site surveys for radiological contamination were conducted in 1980 and 1981. Ground water monitor wells were installed in 1982, 1984, 1985, 1987, and 1994. Remedial action site investigations and characterization studies formally commenced in 1984 when the GJO facility was accepted into the SFMP. The resulting data were analyzed in preparation for development of a National Environmental Policy Act- (NEPA-) compliant Environmental Assessment. With the passage of the Superfund Amendments and Reauthorization Act in 1986 and the subsequent implementation of Executive Order 12580, "Superfund Implementation," the GJO facility was evaluated in accordance with CERCLA. Although the resulting Hazard Ranking System score was below the value required for inclusion on the National Priorities List, the GJO facility remediation followed the CERCLA process in accordance with DOE policy. A Finding of No Significant Impact was issued by DOE in 1990 (DOE 1990). The remediation as conducted as the Grand Junction Office Remedial Action Program (GJORAP).²

Site ground water was characterized and modeled in the CERCLA-compliant Remedial Investigation. Modeling results indicate that the ground water will flush clean of contaminants in 50 to 80 years, which is within the 100 year compliance period specified in 40 CFR 192 (DOE 1989a). The compliance period began with the signing of the ROD in 1989 (DOE 1989b).

The selected remedial action alternative was removal of contaminated soils and building debris and codisposal with residual radioactive material from Grand Junction-area UMTRA Project activities, and remediation of the ground water contamination through natural flushing (DOE 1989b).

Remediation of the GJO facility commenced in 1986. Remediation of assessed contamination in exterior land areas was completed in 1994. Remediation of one building (Building 7) commenced in spring 2001. Remediation of affected portions of Buildings 12 and 20 is deferred, as described in Section 1.3. Remediation of remaining GJO facility buildings is complete. Site surface and ground water will be remediated through natural flushing.

2.3 Final GJO Facility Conditions

Site ground water and surface water contain contaminants in concentrations exceeding regulatory limits. Institutional controls³ have been established as part of the remedy to prevent use of and exposure to contaminated water.

GJO facility buildings have been surveyed. Minor quantities of radioactive materials that remain in two buildings have been deregulated. Building 2 (the original shower and change room) and Building 20 (the analytical laboratory) have known deposits of uranium oxide within the

²The name of the facility was changed from the Grand Junction Projects Office in 1996; the former name for the environmental restoration activity at this location was the Grand Junction Projects Office Remedial Action Project (GJPORAP).

³The term "institutional controls" refers to non-engineering measures—usually, but not always, legal controls—designed to prevent or limit exposure to hazardous substances left in place at a site or to assure effectiveness of the remedy (EPA undated).

buildings. These two buildings were released on the basis of excessive cost for remediation that poses no risk to occupants, the public, or the environment (DOE 1997 and DOE 2000f). All materials in these buildings are deregulated because they do not exceed risk-based release limits, and no contamination remains. This determination complies with DOE policy to keep exposures As Low As Reasonably Achievable.

In addition, uranium and radium contamination remains in soils and on subgrade structures beneath portions of Buildings 12 and 20.

A concrete slab believed to be the remains of a former uranium mill exists beneath the south end of Building 12. Portions of the slab and underlying soil outside the building footprint were removed and found to contain radium-226, thorium-230, and uranium in excess of regulatory limits. A trench was defined beneath the east end of the slab that contained soil with a uranium concentration of 1,430 picocuries per gram (pCi/g) (DOE 2000c); this trench appears to continue beneath the building. A concrete sump integral to the Building 12 foundation has fixed surface contamination as high as 50,000 disintegrations per minute per 100 square centimeters. Preliminary investigations identified soil with elevated concentrations of uranium within the building footprint (DOE 2000b).

A release survey conducted in Building 12 indicated that gamma exposure rates and beta-gamma activity did not exceed background, and the average radon decay-product concentration for this building was 0.006 working level, which is below the 0.020 working level guideline. These measurements indicate that the mill slab and underlying soil do not pose any increased health risk to occupants of Building 12.

Building 20 was used as a laboratory since 1953. Approximately 95 cubic yards of contaminated soil and concrete rubble was identified beneath the southwest corner of the building (DOE 2000d). Analytical laboratory results for soil samples collected from the deposit of contaminated soil had maximum concentrations of 177 pCi/g for radium-226, 148 pCi/g for thorium-230; and 269 pCi/g for total uranium (DOE 2000e).

Gamma exposure rates and radon decay-product concentrations inside Building 20 are less than the guideline values. Other measurements of exposure have been collected inside of the building through long-term dosimeters placed on the east and west sides of the building. Gamma exposure in the west end of the building, near the contamination, was not greater than the gamma exposure at the east end of the building. On the basis of these measurements, this deposit does not pose an increased health risk to the occupants of Building 20.

DOE will demolish Buildings 12 and 20 (in their entirety) when DOE operations in those buildings cease. The building structures have been released for unrestricted use, and the demolition debris will be hauled to a public landfill. Contaminated soil and debris was left under the west end of Building 20 for economic and structural reasons. The contaminated concrete slab and soil under the south end of Building 12 was left in place for economic reasons. DOE will remediate the contaminated materials beneath the buildings and dispose of the material at the Grand Junction Disposal Site. The soil within the building footprints will be radiologically verified to comply with regulatory limits.

Building 7A (the former sample plant) is contaminated with uranium oxide and will be demolished in spring 2001.

Exterior land areas have been remediated and comply with applicable clean up standards (DOE 1995b). These areas are released for unrestricted use.

Asbestos has been identified in buildings, and may be associated with abandoned underground steam lines (DOE 1995c). Polychlorinated biphenyls (PCBs) have been identified in fluorescent light ballasts (DOE 1995d). DOE has disclosed the existence of these substances to the new owner and has no further obligation for management or disposal of these substances.

2.4 Ground Water Conditions

Ground water occurs under unconfined conditions in the alluvial aquifer (uppermost aquifer) beneath the GJO facility. Depth to ground water ranges from 5 to 10 feet (1.5 to 3 meters) beneath the surface, and generally flows to the north. Ground water has been monitored regularly to determine compliance with Federal and state ground-water quality regulations.

Ground water at the GJO facility must comply with the more stringent of the limits established for potentially useable water in 40 CFR 192 and 5 CCR 1002-8, "Basic Standards for Ground Water." Ground water standards are discussed in more detail in Section 3.6.1.

2.4.1 Background Ground Water Characteristics

Water samples were collected from the alluvial aquifer up gradient from the GJO facility. The results of analysis for regulated analytes in 1999 are shown in [Table 2-2](#). These results indicate that the unaffected water quality in the alluvial aquifer is similar to that of the Gunnison River, although major cation concentrations increase with residence time.

In 1997, water samples collected by the independent verification contractor were analyzed for Target Compound List volatile organic compounds, semivolatile organic compounds, pesticides, and PCBs. Most of these compounds were not detected in the samples and none of the detected constituents exceeded ground water standards (DOE 1998).

2.4.2 Ground Water Contamination

Site ground water was contaminated by leaching of uranium mill tailings before the tailings were removed from the property. Contaminants exceeding Federal or State standards, as of 1999, include nitrate, total dissolved solids, arsenic, molybdenum, selenium, gross alpha, uranium, chloride, iron, manganese, and sulfate.

Nitrate and arsenic contamination is localized near the South Pond, in the area of the former tailings pile. Elevated total dissolved solids levels appear to be concentrated at the north end of the alluvial aquifer. Molybdenum and uranium contamination is widespread across the entire property. Selenium contamination distribution is sporadic and local, being historically highest in well 6-2N and west of the North Pond (Plate 1). Iron, chloride, manganese, and sulfate distributions will be defined when a rigorous ground water evaluation is performed (see Section 3.6.1).

Table 2-2. Ground Water Standards and 1999 Ground Water Analysis Results^a

Constituent	Standard ^{b,c}	Maximum Up-Gradient Concentrations	Maximum On-Site Concentrations	Maximum Down-Gradient Concentrations
Nitrate	10	0.018	18.55*	<0.289
Total dissolved solids	2,444	1,980	5,220*	2,900*
Aluminum	5	1.147 ^g	1.35 ^f	1.35 ^h
Antimony ^e	0.006			
Arsenic	0.05	0.002	0.23*	0.0084
Barium	1.0	0.022	0.048	0.035
Beryllium	0.004	<0.001	0.001 ^f	<0.001 ^h
Boron ^e	0.75			
Cadmium	0.01	<0.001	0.0015	<0.001
Chloride	250	82.5	397	166
Chromium (total)	0.05	0.0063	0.0146	0.016
Cobalt	0.05	<0.025	0.016 ^f	0.006 ^h
Copper	0.2	0.056	0.16 ^f	0.011 ^h
Fluoride	2	1.1	Not available	1.73 ⁱ
Iron	0.3	0.205	1.69	0.88
Lead	0.05	<0.001	<0.001	<0.001
Lithium ^e	2.5			
Manganese	1.7	0.362	5.26	3.57
Mercury	0.002	-	-	-
Molybdenum	0.1	0.0068	0.299*	0.149*
Nickel	0.1	0.005 ^g	0.023 ^f	0.015 ^h
Nitrite	1	0.018	18.55	<0.289
Selenium	0.01	<0.001	0.122*	0.0104*
Silver	0.05	-	-	-
Sulfate	250	1120	1850	2820
Thallium ^e	0.002			
Vanadium	0.33	<0.01	0.141	0.018
Zinc	2	0.78 ^f	0.056 ^f	0.16 ^h
Gross alpha ^d	15	<17.98	47.36*	6.295
Ra226+228	5.0	0.34	1.38	1.23
Th 230+232	60	-	-	-
Uranium 234+238	30.0	8.39	584.44*	167.08*

^aFrom DOE 2000g.

^bAll concentrations expressed in mg/L except radionuclides, which are expressed in pCi/L.

^cStandards found at 5 CCR 1002-8, 40 CFR 192, or EPA Region 3 Risk-Based Concentration Table, October 2000 update.

^dDoes not include radon or uranium.

^eNot analyzed because this analyte is not a constituent of concern, based on process knowledge of GJO and other uranium ore processing sites.

^fHistorical maximum since 01/01/1995. This parameter not analyzed since 1996.

^gMaximum upstream concentration. Upgradient concentration not available.

^hHistorical maximum since monitoring began. This parameter not analyzed since 1996.

ⁱ1985 result. Not monitored since that time. Only results for upgradient and background wells reported.

An asterisk (*) indicates an out of compliance result; a dash (-) indicates a constituent that is not analyzed because it historically does not exceed the standard.

2.5 Surface-Water Conditions

Surface water exists at the GJO facility in the North Pond, South Pond, wetland areas, and Gunnison River. These bodies are monitored regularly to determine compliance with State surface water quality regulations. Site surface water is in direct hydraulic contact with site ground water and the three bodies of water within the GJO facility boundary exhibit contaminant levels that reflect ground water contamination. Monitoring Gunnison River water serves the additional purpose of determining if ground water flushing is adversely affecting river water quality.

Water quality standards for the Gunnison River are found at 5 CCR 1002-8, "Classifications and Numerical Standards for the Gunnison and Lower Dolores River Basins," on the basis of the following four use classifications: (1) Recreation, Class I, (2) Cold Water Aquatic Life, Class I, (3) Domestic Water Supply, and (4) Agriculture (Table 2-3). This standard does not specify a regulatory limit for radium-226, gross alpha, or gross beta for the Gunnison River. The State surface water standard for radium-226 + 228 is 5 pCi/L. Some of the limits are derived from background surface-water quality measurement results.

2.5.1 Background Surface Water Characteristics

Background surface-water quality samples were collected from the upstream Gunnison River sampling location and analyzed for metals, major cations, major anions, radionuclides, and total dissolved solids. Surface measurements of alkalinity, turbidity, pH, conductivity, and temperature were made at the time of collection.

Historically, uranium concentrations in the Gunnison River samples have been generally constant for all sampling locations, and all results were below the standard of 40 pCi/L. The samples were analyzed also for gross alpha, gross beta, and radium-226 activity. All results were near detection limits (DOE 2000g). Background water quality data are presented as upstream sample location results in Table 2-3.

2.5.2 Surface-Water Contamination

In 1999, surface water in the North Pond, South Pond, and wetland areas exceeded State standards for one or more of the following constituents or properties: chloride, chromium, manganese, pH, sulfate, and total uranium (Table 2-3).

Table 2-3. Surface Water Standards and 1999 Surface Water Analysis Results^a

Constituent	Standard ^{b,c}	Gunnison River			On-Site Surface Water		
		Upstream	Adjacent to Site	Down-stream	North Pond	South Pond	Wetland Area
Chloride	250	9.8	9.88	10.1	326*	136	2,260
Nitrate	10	0.761	0.761	0.723	0.020	0.117	0.181
Nitrite	0.05	-	-	-	-	-	-
Sulfate	480	310	313	317	2,180*	1,800*	20,400*
Total dissolved solids	N/A	643	640	635	3,950	2,970	35,900
Dissolved oxygen	7.0	-	-	-	-	-	-
pH	6.5-9.0	8.15 – 8.4	8.2 – 8.64	8.56 – 8.64	8.33 – 8.41	8 – 8.78	8.84 – 10.1*
Fecal coliform	200	-	-	-	-	-	-
Arsenic	0.05	0.00058	0.005	0.0055	0.0043	0.0028	0.0063
Cadmium	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium -6	0.011	0.0053	0.0123*	0.0057	0.0054	0.047*	0.0099
Copper	0.012	-	-	-	-	-	-
Iron	0.3	0.0072	0.0096	0.0034	<0.009	0.0698	<0.009
lead	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	0.05	0.0516*	0.0668*	0.0614*	0.040	0.0526*	0.503*
Mercury	0.0001	-	-	-	-	-	-
Nickel	0.098	-	-	-	-	-	-
Selenium	0.008	0.0072	0.0073	0.0072	0.0045	0.0017	0.0012
Silver	0.003	-	-	-	-	-	-
Zinc	0.137	-	-	-	-	-	-
Uranium	40	5.22	4.74	5.15	149.8*	307.1*	1,319.0*
Radium							
226 + 228	5.0	0.44	0.39	1.25	<0.98	<1.35	<1.11
Gross Alpha	N/A	5.47	7.46	5.47	147.8	300.3	1,129
Gross Beta	N/A	<5.95	6.75	<5.45	65.0	144	524.7

^aFrom DOE 2000g.

^bAll concentrations presented in mg/L except uranium, gross alpha, gross beta, and radium 226 + 228, which are presented in pCi/L; pH, which is unitless; and fecal coliform, which is presented as colonies per 100 milliliters.

^cStandards are found at 5 CCR 1002-8.

An asterisk (*) indicates an out of compliance result; a dash (-) indicates a constituent that is not analyzed because it historically does not exceed the standard.

2.6 Institutional Controls

Institutional controls have been applied to the GJO facility to prevent inadvertent exposure to contaminated media. The controls include:

- Restrictions on the use of ground water, surface water, and aquatic life in the ponds and wetland areas;
- Controls to prevent disturbing the well containing radium foil; and
- Controls to prevent disturbing soil and structures associated with identified contamination beneath Buildings 12 and 20.

The controls and obligations of involved parties are defined in deed restrictions that are attached to the Deed and title and recorded in the Records of Mesa County. These controls will survive subsequent property transfers. These institutional controls will be monitored by the LTSM Program and enforced by the State of Colorado Department of Public Health and Environment (CDPHE) through CERCLA authorities, as specified in the sale and transfer agreements. These controls are presented in Appendix F and summarized below.

Surface Water and Ground Water? To prevent exposure to contaminated ground and surface water, the LTSM Program will notify owners through deed restrictions and annual reports of water quality and of prohibitions against water use; maintain warning signs around the ponds and wetland areas; and inspect the site annually and access state records for well permit information.

Controls prohibiting use of site ground water and surface water will remain in effect until water quality complies with regulatory limits; these controls must survive any subsequent property transfers (see Section 3.6, "Environmental Monitoring").

Well Containing Radium Foil? To ensure that the radium foil remains sealed and isolated, the LTSM Program will notify owners through deed restrictions and annual reports of the presence of the sealed well and of prohibitions against causing subsurface disturbances in the area, and will maintain a warning plaque at the ground surface above the well.

Controls prohibiting disturbance of the radium foil in the sealed well will remain in effect in perpetuity.

Contamination Beneath Buildings 12 and 20? To prevent exposure to contaminated soil and subgrade structures, the LTSM Program will notify owners through deed restrictions and annual reports of prohibitions against structural modifications to Building 20; control access to Building 12 and demolish the affected portion of the building upon vacation; and inspect the site annually, including the affected portion of Building 20.

Controls prohibiting disturbance of soils and structures associated with the contaminated portions of Buildings 12 and 20 will be enforced by DOE until contaminated materials have been removed from the GJO facility and the affected areas have been verified to comply with regulatory limits.

Property records have been annotated to document the DOE right of access; the history of site operations, the nature of site contaminants, the remedial actions conducted by DOE; and use restrictions imposed on property owners. Property record annotations will also include a covenant warranting that remedial action is complete or has been deferred, and if additional remedial action is found to be necessary after site transfer, it will be conducted by the United States of America (see 42 USC 9620(h) and EPA undated). Site remedial action records will be maintained by the LTSM Program at least until the site can be released for unrestricted use and unlimited exposure.

2.7 Site Drawings and Photographs

At the completion of remedial action, GJO site conditions were documented with as-built drawings and maps. Aerial photographs are taken regularly of the GJO facility. These documents are included in GJO facility records.

2.7.1 Site Map

The GJO facility map (Plate 1) shows the approximate site property boundary, fences, structures, roads inside and near the property boundary, monitor wells, survey monuments, section, township, range, and principal meridian. The map has a scale of 1 in. = 100 ft (1:1,200). Map data are maintained in a geographical information system database.

The site map data will be used to generate a base map for site inspections. After each inspection, a new inspection map will be prepared that shows the location of items of interest noted during previous inspections. Each site inspection map will indicate the year of the inspection and inspection purpose.

2.7.2 Site As-Built Drawings and Maps

As reclamation progressed, as-built conditions at the site were documented in as-built drawings and maps. These drawings and maps are included in the GJO facility final reports ([Appendix B](#)) which are archived in the permanent site file. The as-built map data will comprise the initial site base map data.

2.7.3 Site Baseline Photographs

Photographs taken during various phases of GJO facility remediation and a photographic record of final site conditions are maintained in the GJO facility permanent site file. These photographs provide a visual record to complement the as-built drawings and maps.

The site will be extensively photographed on the ground by LTSM Program personnel during the verification and orientation inspection of the site. This will occur as stewardship responsibility for the site is transferred to the LTSM Program. This initial set of photographs will serve as site baseline photographs.

2.7.4 Site Aerial Photographs

Aerial photographs of the GJO facility (in black and white or color) have been taken numerous times during operation of the mills and during reclamation of the GJO facility. The photographs provide a continuous record for monitoring changing conditions (e.g., erosion, vegetation, and land use) over time and are preserved in the permanent site file.

2.7.5 Site Inspection Photographs

Photographs will also be taken during subsequent annual site inspections to document current conditions, especially new or changed conditions, at the site. Comparison of current photographs

with the baseline set of photographs will be useful to document steady or changing conditions at the site over time.

2.8 Specific Site-Surveillance Features

Buildings 12 and 20, warning signs and a warning monument, a survey monument, surface waters, and monitor wells comprise the specific site-surveillance features at the GJO facility. These features are shown on Plate 1.

2.8.1 Warning Signs

DOE has installed and will maintain 13 warning signs around the South Pond, North Pond, and wetland areas (Plate 1). These signs inform the public that surface waters are contaminated and that swimming in, taking fish from, extracting, and drinking the surface waters is prohibited. DOE will inspect these signs until processing-related contaminants have flushed out of surface waters and the State of Colorado concurs that surface waters are safe for unrestricted use. Warning signs present the 24-hour telephone number for DOE-GJO and the LTSM Program ((970) 248-6070).

A ground-level monument was installed over the well containing the radium foil.

2.8.2 Monitor Wells

The ground water monitor well network consists of 6 monitor wells located inside or adjacent to the GJO facility property (Plate 1). These wells are completed in the alluvial aquifer. Construction details and lithologic logs for the wells are archived in GJO facility records. Sampling frequency and analytes for the wells are summarized in Section 3.6, "Environmental Monitoring."

3.0 Long-Term Stewardship Program

3.1 Stewardship Overview

DOE will conduct stewardship activities at the GJO facility to protect human health, safety, and the environment and to comply with applicable regulations and DOE policy. DOE owns and is responsible for the regulated radiological substances and the contaminants in ground and surface water that remain on the GJO facility. The State of Colorado, as regulator, has authority to oversee DOE stewardship activities at this site and will concur in changes to this LTSP. DOE retains the right of access to the GJO facility to conduct stewardship activities for the duration of these activities. This right is established in the transfer agreement (DOE 2001e).

DOE will monitor ground water and surface water at the site to ensure compliance with State of Colorado and Federal standards. Existing ground water and surface water conditions are described in Sections 2.4 and 2.5. The compliance strategy for site ground water is presented in Section 3.7.1, along with details of the monitoring program. Surface water monitoring is discussed in Section 3.7.2.

DOE will manage radiological contamination left in place beneath Buildings 12 and 20. Management is accomplished through inspections and maintaining access controls and other institutional controls.

DOE will monitor institutional controls and take necessary action to ensure the effectiveness of or to enforce those controls. Institutional controls in effect at the GJO facility are described in Section 2.6, "Institutional Controls."

Specific long-term stewardship requirements are presented in [Table 3-1](#).

Table 3-1. Long-Term Stewardship Requirements

Requirement	Section
Routine site inspection	3.2
Routine Inspection report	3.3
Follow-up inspections and inspection reports, as necessary	3.4
Routine site maintenance, as necessary	3.5
Emergency measures	3.5
Environmental monitoring	3.6
Institutional controls monitoring	3.7
Regulatory compliance monitoring	3.8

3.2 Routine Site Inspections

3.2.1 Frequency of Inspections

The GJO facility will be inspected by DOE to confirm that institutional controls remain effective and to determine if maintenance or monitoring is needed.

DOE will inspect the GJO facility once each calendar year. The date of the inspection may vary from year to year to enable inspectors to observe the GJO facility in different seasons. Variation

to this inspection frequency will be explained in the inspection report. DOE will notify CDPHE and the site owner of the inspection at least 30 days before the scheduled inspection date.

3.2.2 Inspection Procedure

For the purposes of inspection, the GJO facility will be divided into sections called transects. Each transect will be inspected individually. Proposed transects for the first inspection of the GJO facility are presented in [Table 3-2](#).

Table 3-2. Transects Used During Initial Inspection of the GJO Facility

Transect	Description
Site Interior (inside RTC property boundary).	Includes the South Pond, North Pond, wetland areas, the affected portions of Buildings 12 and 20, monitor wells, and the radium foil well. The proposed Army Reserve Area is excluded.
Areas beyond GJO Facility boundary.	Includes one survey monument and outlying areas up to 0.25 mi (0.4 km) beyond the GJO Facility.

The site interior transect will be inspected for evidence of ground water and surface water use. Within each transect, the condition of specific site-surveillance features (Section 2.8), such as warning signs and monitor wells will be inspected for change, deterioration, and other effects such as vandalism. Inspectors will physically inspect the affected portions of Buildings 12 and 20 and note any indication that the floor has been penetrated. Inspectors will note changes to the area surrounding the site, especially within 0.25 mi (0.4 km) of the site perimeter. Significant changes within this area could include development or expansion of gravel extraction, human habitation, erosion, or road building.

It may be necessary to document some observations with photographs. Such observations may be evidence of vandalism or water use. An example Field Photograph Log is included in [Appendix C](#).

3.2.3 Inspection Checklist

The inspection is guided by the inspection checklist. The initial site-specific inspection checklist for the GJO facility is presented in [Appendix D](#). The inspection checklist addresses preparation for the inspection, health and safety concerns, and performance of the inspection. Inspectors also will have the drafted site inspection map from the previous inspection. The map graphically depicts the locations of noted observations from previous inspections and is used to record field notes, photograph locations, and other annotations of inspection findings. The field map becomes a part of the permanent site record.

The checklist is reviewed and revised as necessary prior to each routine inspection. At the conclusion of a routine site inspection, inspectors will note revisions to the checklist in anticipation of the next routine site inspection. Revisions to the checklist may include inspection instructions addressing new discoveries or changes in site conditions or updated telephone numbers and directions to local medical facilities.

3.2.4 Personnel

Typically, annual inspections will be performed by two inspectors. Inspectors will be experienced engineers or scientists who have the required knowledge, skills, and abilities to evaluate site conditions and recognize imminent or actual problems.

Inspectors will be assigned for a given inspection episode of the GJO facility on the basis of site conditions and inspector expertise. Areas of expertise include civil, geotechnical, and geological engineering; geology, hydrology, biology, and environmental science (e.g., ecology, soils, or range management). If conditions warrant, more than two inspectors may be assigned to the inspection to evaluate serious or unusual problems and make appropriate recommendations.

3.3 Routine Inspection Reports

Results of routine site inspections will be reported to DOE program management, CDPHE, and the site owner(s). The report also will address monitoring results for the previous 12 months.

3.4 Follow-up Inspections

Follow-up inspections are unscheduled inspections that are conducted in response to threatening or unusual site conditions.

3.4.1 Criteria

Criteria for follow-up inspections of the GJO facility are adopted from 10 CFR 40.28 (b)(4). The LTSM Program will conduct follow-up inspections if the following occurs:

1. A condition is identified during the routine site inspection, or other site visit, that requires personnel with specific expertise to return to the site to evaluate the condition; or
2. DOE is notified by a citizen, employee, or federal, state, or local agency that conditions at the site are substantially changed.

Once a condition or concern is identified at the site, LTSM Program personnel will evaluate the information and decide whether to respond with a follow-up inspection.

Specific conditions that may necessitate a follow-up inspection include intrusion, violation of institutional controls, vandalism, or the need to revisit the site to evaluate, define, or conduct maintenance tasks. Conditions that may require a more immediate follow-up inspection include extreme weather or seismic events and disclosure of deliberate human activity that threatens the integrity of institutional controls. DOE will act responsibly but will exercise flexibility and will evaluate risk when scheduling follow-up inspections. Urgency of the follow-up inspection will be in proportion to the seriousness of the condition.

In the event of an incident or activity that threatens or compromises institutional controls or poses a risk of exposure to or release of known contaminants, DOE may, as appropriate, notify CDPHE, begin the DOE occurrence notification process (DOE Order 232.1), respond with an

immediate follow-up inspection, and begin emergency measures (Section 3.6) to contain or prevent dispersion of hazardous materials from the GJO facility. At any time, DOE may request the assistance of local authorities to confirm the seriousness of a condition at the site before scheduling a follow-up inspection or initiating other action.

The LTSM Program has arranged for these government agencies to notify DOE in the event of human intrusion or unusual-to-catastrophic natural events in the vicinity of the site: the Mesa County Sheriff's Department in Grand Junction and the U.S. Geological Survey National Earthquake Information Center in Denver, Colorado. These agencies will contact DOE should an event occur that might affect the control of known contaminants or condition of site surveillance features at the GJO facility. Agency notification agreements are presented in [Appendix E](#).

To facilitate DOE notification and to address citizen concerns, warning signs posted near contaminated surface waters display a 24-hour DOE-GJO telephone number. The public may use the 24-hour number to request information about the site or to advise DOE of problems at the site. DOE may conduct follow-up inspections in response to information provided by the public.

3.4.2 Personnel

Inspectors assigned to follow-up inspections will be selected on the same basis as for routine site inspections. (See Section 3.3.4.)

3.4.3 Reports of Follow-up Inspections

Results of follow-up inspections will be included in the next annual inspection report (Section 3.4). Separate reports will not be prepared unless DOE determines it advisable to notify CDPHE or another outside agency of a problem at the site.

If follow-up inspections are required for more serious or emergency reasons, DOE will submit to CDPHE a preliminary report of the follow-up inspection within 60 days.

3.5 Routine Site Maintenance and Emergency Measures

3.5.1 Routine Site Maintenance

Assessed contaminated materials were removed from the GJO facility except as noted previously. DOE will maintain site access controls for DOE-leased portions of the GJO facility as part of DOE operations; this activity is not in the scope of LTSM Program activities at this location. The LTSM Program will conduct any required well maintenance and abandonment. Other maintenance tasks might include sign replacement and maintenance of the calibration model facility.

3.5.2 Emergency Measures

Emergency measures are the actions DOE will take in response to an incident that may result in exposure to or release of known contamination for which DOE is responsible.

3.5.3 Criteria for Routine Site Maintenance and Emergency Measures

Criteria for triggering a given DOE response for each progressively more serious level of intervention are not easily defined because the nature and scale of all potential problems can not be foreseen. The difference between routine maintenance and emergency responses is primarily one of urgency and degree of threat or risk.

3.5.4 Reporting Maintenance and Emergency Measures

Routine maintenance completed during the previous 12 months will be summarized in the next routine inspection report. Although the probability of such an occurrence is low, DOE will notify the CDPHE within 4 hours of discovery of any potential or actual exposure to or release of regulated hazardous materials. The phone number for the 4-hour contact to CDPHE is in the Inspection Checklist (Appendix D).

3.6 Environmental Monitoring

Environmental monitoring results will be reported in the routine inspection report.

3.6.1 Ground Water Monitoring

The compliance strategy to meet the more stringent of applicable Federal and State of Colorado ground water protection standards is natural flushing (monitored natural attenuation). Ground water flow and transport modeling predicted that cleanup of ground water in the uppermost (alluvial) aquifer will occur within a 50 to 80 year timeframe (DOE 1989a). This strategy is described in the Record of Decision (DOE 1989b) and evaluated in *Evaluation of Ground Water and Surface Water Monitoring for the Grand Junction Office Facility* (DOE 2000a).

The State of Colorado is the primary regulator for ground water and surface water compliance at the GJO facility. Ground water quality must comply with the basic standards for ground water found in 5 CCR 1002-8, and also with ground water standards specified in 40 CFR 192.

The ground water monitoring network consists of 6 monitor wells (8-4S, 11-1S, 6-2N, 14-13NA, GJ84-04, and 10-19N) that are distributed onsite and along the downgradient edges of the facility near the Gunnison River ([Figure 3-1](#) and Plate 1).

The analytes to be monitored in ground water during each sampling event are shown in [Table 3-3](#) and include the constituents of concern and other constituents that may be useful in assessing site conditions. These were identified on the basis of historical monitoring results (Table 2-2) and the ecological and human health risk assessment (DOE 2001c). Many other constituents have been analyzed in the past and have been deleted from the list because they have historically been below regulatory limits or concentrations co-vary with the selected analytes and are not required to assess the progress of natural flushing. In addition to these analytes, standard water quality indicators (pH, alkalinity, conductivity, temperature, and turbidity) will be measured during each sampling event.

Table 3-3. Analytes to be Monitored in Ground Water and Surface Water at the GJO Facility

Analyte	Basis for Analyte Selection		
	Exceeds Regulatory Limit	Poses Ecological Risk	Poses Human Health Risk
Arsenic	X		X
Chloride	X		
Chromium	X		
Gross Alpha	X		
Magnesium		X	
Manganese	X	X	X
Molybdenum	X	X	X
Nitrate	X		
Selenium	X		
Sulfate	X		X
Total dissolved solids	X		
Total Uranium	X	X	X

The LTSM Program will conduct ground water monitoring at the GJO facility annually, in late winter, for a minimum period of 5 years (through 2005). At the end of this period DOE will evaluate monitoring results in consultation with the State of Colorado to determine the requirements for future monitoring at the site. This will include a statistical evaluation of contaminant concentration trends. Criteria for modifying or terminating ground water and surface water monitoring will include (1) continued decrease in concentrations of constituents of concern as predicted and observed, (2) compliance with regulatory limits, and (3) no unacceptable risks to human health and the environment resulting from site-related contamination. DOE will receive approval from the State of Colorado prior to modification or termination of monitoring. (DOE 2001b) Modification may include changing or adding additional sample locations or changing the suite of analytes. Additional verification sample locations may be needed to demonstrate site-wide compliance with applicable standards, including addition of sample locations in the property interior.

3.6.2 Surface Water Monitoring

The compliance strategy for surface waters at the GJO Facility is monitored natural flushing. Monitoring and evaluation for surface waters will be the same as for ground water.

The surface-water monitoring network includes two locations in the Gunnison River, and one location each in the North Pond, South Pond, and wetland areas (Figure 3-1 and Plate 1). The analytes to be monitored in surface water during each sampling event are the same for ground water (Table 3-3). Surface water quality must comply with the water quality standards for the Gunnison River found at 5 CCR 1002-8. The frequency and duration of surface-water monitoring will be the same as for the ground water monitoring. Trend analyses will be performed on surface water sampling results in conjunction with analysis of ground water sampling results.

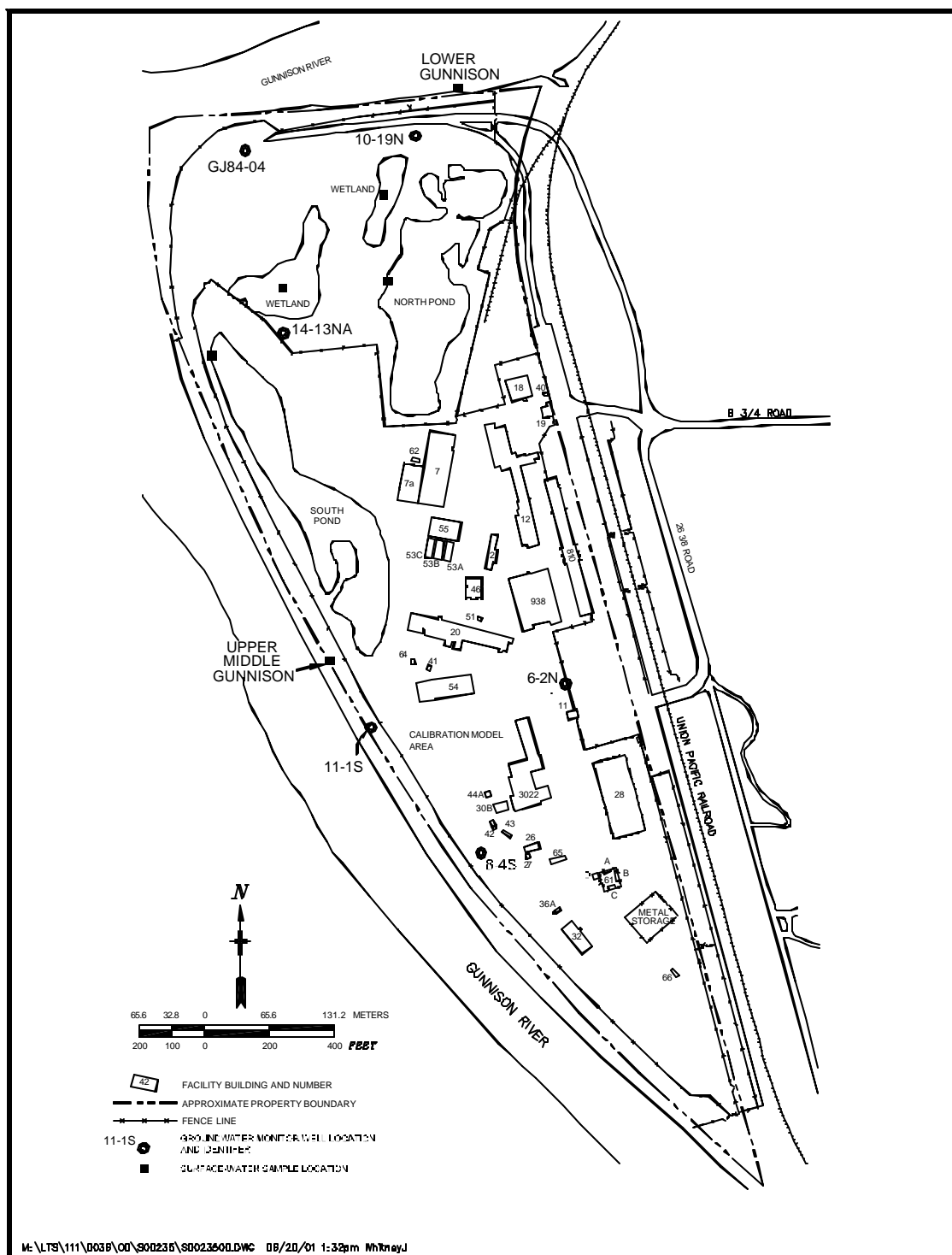


Figure 3-1. Ground Water and Surface Water Monitoring Locations

3.6.3 Sediment Monitoring

In 2001, DOE will conduct sampling to establish baseline chemistry data for pond and wetland area sediments. These locations will be sampled again when ground and surface water complies with regulatory limits to verify that pond and wetland areas sediments also comply with applicable limits. Sample locations will be selected to represent worst case and average conditions (e.g., deep water, near shore, and intermittently inundated areas). Analytes will include those shown in Table 3B3, as appropriate, plus isotopic uranium. On the basis of the initial results, DOE will revise this LTSP to present sampling locations and results, and, if necessary, invoke a program for further sediment monitoring.

3.7 Institutional Controls Monitoring

At the time of the routine site inspection, and at other times as necessary, LTSM Program personnel will evaluate institutional controls applied to the GJO facility and will take appropriate action if those controls are found to not fully protect human health and the environment. The evaluation will include the following:

- Inspect the site for evidence of ground or surface water use;
- Inspect the affected portions of Buildings 12 and 20 for evidence of construction or demolition (owner's permission is required for access to Building 20); and
- Contact the Colorado State Engineer's Office for a report of well permit applications for the GJO facility.

DOE will take appropriate action on the basis of the results of this monitoring to ensure that the regulated materials for which DOE is responsible are controlled. The results of this monitoring will be presented in the routine inspection report.

3.8 Regulatory Compliance Monitoring

At the time of the routine site inspection, the LTSM Program will demonstrate that DOE remains in compliance with regulations governing stewardship activities at the GJO facility. Those regulations are specified in Section 1.2, "Legal and Regulatory Requirements."

An evaluation of regulatory compliance may be required at other times, as well, in response to unusual or nonroutine occurrences. The results of this monitoring will be presented in the routine inspection report. Instances of noncompliance will be reported to regulators in accordance with the procedures set forth in Section 3.5.4, "Reporting Maintenance and Emergency Measures."

3.9 Records

The LTSM Program maintains site records in a permanent site file. These records are available for inspection by government agencies or the public.

All LTSM Program records are maintained in full compliance with DOE and National Archives and Records Administration requirements:

1. DOE Order 1324.2A, "Records Disposition"
2. 36 CFR Parts 1220-1236, "National Archives and Records Administration"

3.10 Quality Assurance

The long-term custody of the GJO facility and all activities related to the annual surveillance and maintenance of the site will comply with DOE Order 414.1A, "Quality Assurance [QA]," the DOE contractor's *Long-Term Surveillance and Maintenance Program Quality Assurance Program Plan* (DOE 1999), and the draft "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs" (ASQC 1994).

QA requirements will be transmitted through procurement documents to subcontractors when appropriate.

3.11 Health and Safety

Health and safety procedures for LTSM Program activities are consistent with DOE orders, regulations, codes, and standards. LTSM Program activities are conducted in accordance with the DOE-GJO site-wide Health and Safety Manual.

Immediate health and safety concerns are listed in the Inspection Checklist (Appendix D). Also in the Health and Safety section of the Inspection Checklist are 24-hour emergency phone numbers for fire, hospital and ambulance, and sheriff. Directions from the site to the nearest hospital with an emergency room are also included. The checklist is updated before each routine inspection to advise assigned personnel of new and continuing health and safety considerations. A Job Safety Analysis is prepared before each routine inspection and is presented as part of a pre-inspection briefing held several days before the inspection. At the briefing, personnel who will be on site review the Job Safety Analysis and are instructed on hazards that may be present at the site and on health and safety procedures that must be followed.

Subcontractors are advised of health and safety requirements through appropriate procurement documents. Subcontractors must submit health and safety plans for all actions subject to Occupational Safety and Health Administration (OSHA) requirements. Subcontractor health and safety plans will be reviewed and approved before the contract is awarded. Proposals from subcontractors without an adequate health and safety plan will be rejected.

4.0 References

American Society for Quality Control (ASQC), 1994. *Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs*, draft, ANSI/ASQC E4-19XX, Energy and Environmental Quality Division, Environmental Issues Group, January 1994.

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U.S. Department of Energy (DOE), 1995d. *Grand Junction Projects Office Facility, Grand Junction Projects Office Remedial Action Project, Monticello Mill Tailings Site, Environmental Monitoring Plan*, P-GJPO-109, Revision 2, Grand Junction Projects Office, Grand Junction, Colorado, November. [last updated October 1999]

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———, 2001d. Deed for the portion of the Grand Junction Office facility transferred by DOE to the Riverview Technology Corporation, not yet executed.

———, 2001e. “Offer to Purchase and Acceptance,” [sales contract conveying the GJO facility from DOE to the Riverview Technology Corporation, including Terms and Conditions for Sale No. 7-B-CO-463 B], Grand Junction Office, Grand Junction, Colorado, not finalized.

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DOE Orders

Order 232.1, “Occurrence Reporting and Processing of Operations Information,”
October 30, 1995.
Order 414.1A, “Quality Assurance”
Order 1324.2A, “Records Disposition”
Order 5400.1, “General Environmental Protection Program,” June 29, 1990
Order 5400.5, “Radiation Protection of the Public and the Environment,” June 5, 1990

Code of Federal Regulations

10 CFR 40. “Domestic Licensing of Source Material”
40 CFR 192, “Health and Environmental Protection Standards for Uranium and Thorium Mill
Tailings”

Colorado Code of Regulations

5 CCR 1002-8, “Colorado Ground Water Standards”

Appendix A
Legal Description of the GJO Facility and
Real Estate Documentation

The property transferred by DOE to the Riverview Technology Corporation by quit claim deed (Records of Mesa County, Book ____, Page ____) is described as follows:

All that portion of Lot 1 lying West of the right-of-way of the Denver and Rio Grande Western Railroad Company, and all of lots 6 and 7, subject to right-of-way of the Denver and Rio Grande Western Railroad Company, all being in Section 27, Township 1 South, Range 1 West, Ute Meridian, Mesa County, Colorado containing 55.71 acres of land more or less, together with the private railroad spur thereon, and all rights and appurtenance thereto, also all water and water rights used thereon or appurtenant thereto, including the private line from artesian well, and all rights in connection therewith, and all buildings and improvements thereon as recorded in Book 415, Page 405;

And, that portion of G.L.O. Lot 1, Section 26, Township 1 South, Range 1 West, Ute Principal Meridian, Mesa County, Colorado lying west of the right-of-way of the Denver and Rio Grande Western Railroad Company containing 1.14 acres of land more or less, as recorded in Book 668, Page 202;

Except: Parcel 1, located in G.L.O. Lot 7 of Section 27, Township 1 South, Range 1 West, Ute Principal Meridian, Mesa County, Colorado containing 2.68 acres of land more or less as conveyed to A. N. Applebaum and recorded in Book 1606, Page 986; and

Except that portion to be reserved to the United States and called the Army Reserve Tract: containing 7.97 acres more or less;

This parcel then contains 46.20 acres calculated as follows: 55.71 acres (1943 Deed in Book 415, Page 405) plus 1.14 acres (Deed in Book 668, Page 202) - minus - 2.68 acres (Deed in Book 1606, Page 986) - minus - 7.97 acres (Army Reserve Tract to be recorded) equals 46.20 acres of land more or less.

(Note: book and page references refer to records of Mesa County, Colorado. The book and page reference for the quit claim deed will be inserted when that document is entered into the public records.)

Appendix B
Grand Junction Office Remedial Action Program
Final Reports

Final Report of the Decontamination and Decommissioning of the Exterior Land Areas at the Grand Junction Projects Office Facility, DOE/ID/12584-220, GJPO-GJ-13, Grand Junction Projects Office, Grand Junction, Colorado, September 1995.

Final Report of the Decontamination and Decommissioning of Building 1 at the Grand Junction Projects Office Facility, DOE/ID/12584-276, GJPO-GJ-36, Grand Junction Projects Office, Grand Junction, Colorado, August 1996.

Technical Basis for Radiological Release of Grand Junction Office Building 2, GJO-97-12-FOS, GJO-GJ-45, Grand Junction Projects Office, Grand Junction, Colorado, July 1997.

Final Report of the Decontamination and Decommissioning of Building 6 at the Grand Junction Projects Office Facility, DOE/ID/12584-254, GJPO-GJ-25, Grand Junction Projects Office, Grand Junction, Colorado, July 1996.

Closeout Report of the Decontamination and Decommissioning of the South Bay (Phase I) of Building 7 at the Grand Junction Office Facility, GJO-99-98-FOS, Grand Junction Office, Grand Junction, Colorado, April 1999.

Closeout Report of the Decontamination and Decommissioning of the Center and North Sections (Phase II) of Building 7 at the Grand Junction Office Facility, GJO-99-119-FOS, Grand Junction Office, Grand Junction, Colorado, December 1999.

Final Report of the Radiological Release Survey of Building 11 at the Grand Junction Office Facility, GJO-97-15-FOS, GJO-GJ-46, Grand Junction Projects Office, Grand Junction, Colorado, September 1997.

Final Report of the Decontamination and Decommissioning of Building 18 at the Grand Junction Projects Office Facility, DOE/ID/12584-278, GJPO-GJ-39, Grand Junction Projects Office, Grand Junction, Colorado, September 1996.

Final Report of the Radiological Release Survey of Building 19 at the Grand Junction Office Facility, GJO-97-16-FOS, GJO-GJ-47, Grand Junction Projects Office, Grand Junction, Colorado, September 1997.

Building 20 closeout documentation is pending.

Closeout Report of the Radiological Release Survey of Building 26 at the Grand Junction Office Facility, GJO-99-82-FOS, Grand Junction Office, Grand Junction, Colorado, January 1999.

Radiological Survey Map, Building 27, Grand Junction Office, Grand Junction, Colorado, March 1, 2000.

Closeout Report of the Decontamination and Decommissioning of Building 28 at the Grand Junction Office Facility, GJO-99-83-FOS, Grand Junction Office, Grand Junction, Colorado, January 1999.

Final Report of the Radiological Release Survey of Building 29 at the Grand Junction Office Facility, GJO-97-17-FOS, GJO-GJ-48, Grand Junction Projects Office, Grand Junction, Colorado, September 1997. (A final radiological release survey will be required when DOE-GJO vacates this building.)

Closeout Report of the Radiological Release Survey of Building 30 at the Grand Junction Office Facility, GJO-99-84-FOS, Grand Junction Office, Grand Junction, Colorado, January 1999.

Final Report of the Radiological Release Survey of Building 30B at the Grand Junction Office Facility, GJO-97-18-FOS, GJO-GJ-49, Grand Junction Projects Office, Grand Junction, Colorado, September 1997. (A final radiological release survey will be required when DOE-GJO vacates this building.)

Final Report of the Decontamination and Decommissioning of Building 31 at the Grand Junction Projects Office Facility, DOE/ID/12584-257, GJPO-GJ-28, Grand Junction Projects Office, Grand Junction, Colorado, July 1996.

Closeout Report of the Decontamination and Decommissioning of Building 31A at the Grand Junction Office Facility, GJO-99-107-FOS, Grand Junction Office, Grand Junction, Colorado, September 1999.

Closeout Report of the Decontamination and Decommissioning of Building 32 at the Grand Junction Office Facility, GJO-2000-150-FOS, Grand Junction Office, Grand Junction, Colorado, July 2000. (A final radiological release survey will be required when DOE-GJO vacates this building.)

Closeout Report of the Decontamination and Decommissioning of Building 33 at the Grand Junction Office Facility, GJO-99-108-FOS, Grand Junction Office, Grand Junction, Colorado, September 1999.

Final Report of the Decontamination and Decommissioning of Building 34 at the Grand Junction Projects Office Facility, DOE/ID/12584-274, GJPO-GJ-34, Grand Junction Projects Office, Grand Junction, Colorado, August 1996.

Closeout Report of the Decontamination and Decommissioning of Building 35 at the Grand Junction Office Facility, GJO-99-109-FOS, Grand Junction Office, Grand Junction, Colorado, September 1999.

Final Report of the Decontamination and Decommissioning of Building 36 at the Grand Junction Projects Office Facility, DOE/ID/12584-275, GJPO-GJ-35, Grand Junction Projects Office, Grand Junction, Colorado, August 1996.

Closeout Report of the Decontamination and Decommissioning of Building 37 at the Grand Junction Office Facility, Grand Junction Office, Grand Junction, Colorado, July 1999.

Final Report of the Decontamination and Decommissioning of Building 39 at the Grand Junction Projects Office Facility, DOE/ID/12584-258, GJPO-GJ-29, Grand Junction Projects Office, Grand Junction, Colorado, July 1996.

Closeout Report of the Radiological Release Survey of Building 40 at the Grand Junction Office Facility, GJO-99-120-FOS, Grand Junction Office, Grand Junction, Colorado, November 1999.

Closeout Report of the Radiological Release Survey of Building 41 at the Grand Junction Office Facility, GJO-99-121-FOS, Grand Junction Office, Grand Junction, Colorado, November 1999.

Closeout Report of the Radiological Release Survey of Building 43 at the Grand Junction Office Facility, GJO-99-122-FOS, Grand Junction Office, Grand Junction, Colorado, November 1999.

Final Report of the Decontamination and Decommissioning of Building 44 at the Grand Junction Projects Office Facility, DOE/ID/12584-260, GJPO-GJ-30, Grand Junction Projects Office, Grand Junction, Colorado, July 1996.

Radiological Survey Map, Building 44A, DOE Grand Junction Office, Grand Junction, Colorado, January 19, 2000.

Closeout Report of the Decontamination and Decommissioning of Building 46 at the Grand Junction Office Facility, GJO-99-85-FOS, Grand Junction Office, Grand Junction, Colorado, January 1999.

Closeout Report of the Radiological Release Survey of Building 51 at the Grand Junction Office Facility, GJO-99-123-FOS, Grand Junction Office, Grand Junction, Colorado, November 1999.

Final Report of the Decontamination and Decommissioning of Building 52 at the Grand Junction Projects Office Facility, DOE/ID/12584-261, GJPO-GJ-31, Grand Junction Projects Office, Grand Junction, Colorado, September 1996.

Building 53C is occupied by Oak Ridge National Laboratory, which will be responsible for documenting that the structure can be released for unrestricted use.

Final Report of the Radiological Release Survey of Building 54 at the Grand Junction Office Facility, GJO-97-19-FOS, GJO-GJ-50, Grand Junction Projects Office, Grand Junction, Colorado, September 1997.

Building 55 is occupied by Oak Ridge National Laboratory, which will be responsible for documenting that the structure can be released for unrestricted use.

Final Report of the Radiological Release Survey of Building 56 at the Grand Junction Office Facility, GJO-97-20-FOS, GJO-GJ-51, Grand Junction Projects Office, Grand Junction, Colorado, September 1997.

Closeout Report of the Radiological Release Survey of Buildings 61A, 61B, and 61C at the Grand Junction Office Facility, GJO-2000-151-FOS, Grand Junction Office, Grand Junction, Colorado, July 2000. (A final radiological release survey will be required when DOE-GJO vacates these buildings).

Radiological Survey Map, Building 61D, DOE Grand Junction Office, Grand Junction, Colorado, January 19, 2000.

Radiological Survey Map, Building 64, DOE Grand Junction Office, Grand Junction, Colorado, January 19, 2000.

Radiological Survey Map, Building 65, Grand Junction Office, Grand Junction, Colorado, December 30, 1999.

Radiological Survey Map, Building 66, Grand Junction Office, Grand Junction, Colorado, December 29, 1999.

Closeout Report of the Radiological Release Survey of Building 810 at the Grand Junction Office Facility, GJO-2000-135-FOS, Grand Junction Office, Grand Junction, Colorado, January 2000.

Closeout Report of the Decontamination and Decommissioning of Building 938 at the Grand Junction Office Facility, GJO-2000-134-FOS, Grand Junction Office, Grand Junction, Colorado, January 2000.

Closeout Report of the Decontamination and Decommissioning of the Abandoned Septic Tanks at the Grand Junction Office Facility, GJO-2000-149-FOS, Grand Junction Office, Grand Junction, Colorado, June 2000.

Closeout Report of the Decontamination and Decommissioning of the Buried Utilities and Soil Under Pavement at the Grand Junction Office Facility, GJO-99-131-FOS, Grand Junction Office, Grand Junction, Colorado, July 2000.

Appendix C
Field Photograph Log

FIELD PHOTOGRAPH LOG

Page 1 of ____

Site: _____

Roll No. ____ (of ____)

Date: _____

Time of Day: Fm _____ To _____

Weather Conditions: _____

Film Data: Size _____ ISO _____ Exposures _____

<u>Frame^a</u>	<u>Azimuth^b</u>	<u>PL No.^c</u>	<u>Subject/Description</u>
0	_____	_____	_____
1	_____	_____	_____
2	_____	_____	_____
3	_____	_____	_____
4	_____	_____	_____
5	_____	_____	_____
6	_____	_____	_____
7	_____	_____	_____
8	_____	_____	_____
9	_____	_____	_____
10	_____	_____	_____
11	_____	_____	_____
12	_____	_____	_____
13	_____	_____	_____
14	_____	_____	_____
15	_____	_____	_____
16	_____	_____	_____
17	_____	_____	_____

Inspector: _____

Signature

Printed Name

^aAdjusted to match frame number on negative.

^bDeclination angle:

^cPhotograph location number. Assigned when inspection report is written. See inspection report, Plate 1, for map of photograph locations.

FIELD PHOTOGRAPH LOG

Page 1 of ____

Site: _____

Roll No. ____ (of ____)

Date: _____

Time of Day: Fm _____ To _____

Weather Conditions: _____

Film Data: Size _____ ISO _____ Exposures _____

<u>Frame^a</u>	<u>Azimuth^b</u>	<u>PL No.^c</u>	<u>Subject/Description</u>
18	_____	_____	_____
19	_____	_____	_____
20	_____	_____	_____
21	_____	_____	_____
22	_____	_____	_____
23	_____	_____	_____
24	_____	_____	_____
25	_____	_____	_____
26	_____	_____	_____
27	_____	_____	_____
28	_____	_____	_____
29	_____	_____	_____
30	_____	_____	_____
31	_____	_____	_____
32	_____	_____	_____
33	_____	_____	_____
34	_____	_____	_____
35	_____	_____	_____
36	_____	_____	_____

Inspector: _____

Signature

Printed Name

^aAdjusted to match frame number on negative.

^bDeclination angle:

^cPhotograph location number. Assigned when inspection report is written. See inspection report, Plate 1, for map of photograph locations.

Appendix D
Routine Site Inspection Checklist

Inspection Checklist Routine Site Inspection

Site: U.S. Department of Energy Grand Junction Office Facility

Date Prepared:

Date of Inspection:

Type of Inspection: Routine Inspection

I. General Instructions

- A. This inspection checklist incorporates general and site-specific requirements for routine inspections of the subject site. Routine inspections typically will be conducted once every 12 months.

This checklist may be revised in response to new requirements, as dictated by results of previous inspections and maintenance requirements, or as new information about the site is received.

- B. The purpose of the checklist is to support

- Planning for the inspection
- Inspection of the site
- Evaluation of the completeness of the inspection before the inspection party leaves the site
- Preparation of the inspection report
- Evaluation of site regulatory compliance and institutional controls effectiveness

- C. This checklist is provided for the convenience of those planning and conducting the inspection. Other information, materials, or guidance may be used in place of or in addition to the checklist if site conditions or institutional requirements warrant.

II. Preparation for the Inspection

- A. Review inspection guidance documents:

- *Guidance for Implementing the Long-Term Surveillance Program for UMTRA Project Title I and Title II Disposal Sites* (DOE 2001b).
- *Long-Term Surveillance Plan [LTSP] for the DOE Grand Junction Grand Junction Office Facility near Grand Junction, Colorado* (June 2001).

B. Review previous inspection reports, field notes from previous inspections, maps and drawings of the site, and other documents as necessary to become familiar with site history, current conditions at the site, and the results of recent inspections and maintenance. Obtain copies of maps, plans, and other documents required for the inspection, including but not limited to:

- Pertinent documents from the site file, such as the *Final Report of the Decontamination and Decommissioning at the Exterior Land Areas at the Grand Junction Projects Office Facility*
- Other GJORAP final reports for individual buildings
- Institutional controls and transfer agreements

Review site access procedures and protocols. Complete actions required to enter the site.

Notify affected agencies.

C. Review specific observations to be made and problems to be studied or resolved during the coming inspection. (See Subsection E of this Section.)

D. Assemble and pack field equipment required for the inspection of the GJO facility:

- Camera
- Spare batteries
- Camera accessories
- Film, three rolls of 36-exposure (or equivalent) color print film
- Photograph scale/north arrow
- Brunton compass
- 50-foot tape
- 10- to 20-foot tape
- Covered clipboard
- Canteens or other provision for water in hot weather
- Sun protection
- Field photograph forms
- Hand-held level
- Orange field notebook
- Black, indelible, felt-tip marker with broad point
- Bolt cutters
- First aid kit
- Sign board

E. General Surveillance

1. Specific Site-Surveillance Features

- Survey monuments (2)
- Warning signs around the bodies of surface water (13) and monument near the sealed well containing radium foil.
- Monitor wells (6)

2. Transects

- RTC site interior, including the affected interior areas of Buildings 12 and 20, the radium foil well; the South Pond, North Pond, wetland areas, and site surveillance features
- Outlying areas up to 0.25 mi (0.4 km) outside the site property

For all transects:

- Condition of site surveillance features
- Evidence of ground water or surface water usage

Area Within 0.25 mi (0.4 km) of the site

- Change in land use
- New construction or development
- Earth movement, erosion, or changes in nearby drainages

3. Maintenance

III. Site Inspection

- A. The checklist is not intended to be exhaustive or constraining. The inspection team is free to exercise judgement to make other observations as site conditions warrant.
- B. Before the inspection of the site is completed and before the inspection team leaves the site, the inspection team should ensure that inspection objectives have been attained, the site has been fully inspected and evaluated, and that sufficient photographs and measurements have been obtained.
- C. Regulated Materials: Look for floor penetrations or exterior excavations in or near the affected portions of Buildings 12 and 20. Check for indication of surface water or ground water use.

D. Health and Safety

Review site conditions before entering site. Known hazards at this location include the following:

The dike and river bank area, especially during peak run off
Asbestos present in pipe lagging, transite building materials, flooring, acoustic insulation, putty, and other occurrences
Confined spaces
Contaminated ground and surface water
PCB-containing light ballasts
On-site traffic
Poisonous plants, insects, and reptiles

The GJO facility site is usually hot and dry in summer and cold and dry in winter. Occasional thunderstorms occur in late summer and light snows occur in winter. Personnel should make provisions for the following seasonal conditions:

Summer:

- Sun protection (a hat is advised).
- Drinking water (personal canteens recommended)
- Rain gear

Winter:

- Warm clothing, preferably layered.

Safety shoes are not required at this site. However, sturdy boots with high ankle support are recommended.

Emergency contacts and phone numbers for the GJO facility are as follows:

- Emergency Medical Service/Ambulance
911
- Fire
911
- Sheriff/Police
(970) 242-6707 Mesa County Sheriff
(970) 248-7277 or 911 for Colorado State Police
- Colorado Department of Public Health and Environment
(970) 248-7164

Inspectors should locate the nearest telephone before commencing inspection activities.

Directions from the site to St. Mary's Hospital are as follows:

- From the GJO facility proceed up the hill past the cemetery, follow the road around to the left to the traffic light at Highway 50.
- Turn left and cross the Colorado River and the railroad tracks, continue straight on 5th Street through downtown and across North Avenue, past the High School to the stop sign at Orchard Avenue.
- Turn right onto Orchard Avenue, proceed to the traffic light at 7th Street.
- Turn left onto 7th Street, look for the sign about 3 blocks up on the left indicating the emergency entrance to the hospital.

IV. Inspection Closeout Summary

A. At the end of the inspection and before leaving the site, the inspection team should:

1. Satisfy itself that it has sufficient information (photographs, notes, measurements, sketches, etc.) to describe and evaluate findings and observations for the site inspection report.
2. Summarize, in the field notes or elsewhere, the following information:
 - Serious problems or threatening factors that require immediate attention or follow-up action;
 - Actual or potential problems not requiring immediate attention but that require further observation possibly including a follow-up inspection; and
 - Changes recommended for this checklist before the next inspection.

B. If serious problems are identified during the inspection, the inspection team should:

1. Immediately notify the DOE-GJO Project Manager (248-6037) and the Contractor LTSM Project Manager (248-6568).
2. Follow GJO procedures for compliance with DOE Order 232.1, "Occurrence Reporting and Processing of Operations Information."

C. Reporting.

Describe pertinent changes to site conditions, results of institutional controls evaluation, and evaluation of regulatory requirements for this site. Note that table value standards are derived on the basis of background water analysis results, and that other water quality limits can change frequently. LTSM Program personnel reviewing water analysis results are advised to confirm current water quality standards.

Appendix E

Institutional Controls

The following institutional controls were included in the transfer documents conveying a portion of the GJO facility to the Riverview Technology Corporation. Institutional controls addressing water use restrictions on the Army Reserve area will be added when those agreements are finalized.

1. Contamination in Ground Water and Surface Expressions of Ground Water

Contamination: The ground water underlying the site and the surface expressions of the ground water (the North Pond, South Pond, and wetland areas) are known by both parties to be contaminated with elevated levels of certain constituents resulting from the historical stockpiling of uranium ore and the disposal of process wastes from milling and concentrating activities. Following removal of the source of contamination, the accepted remedial action for eliminating the contamination is the natural flushing of the ground water over a period of 50 to 80 years (anticipate to be within regulatory standards between the years 2050 and 2080). Risk assessments performed concluded that the contaminants posed a threat to human health only if ingested by drinking the water.

Restriction: Grantee shall not engage in any disturbance or use of any untreated ground water underlying the Property, including the drilling of wells, the excavation of soils that expose ground water, or the diversion of ground water through any means without express written consent of the State of Colorado Department of Public Health and Environment (CDPHE) and the Grantor, its successors or assigns. This also includes, but is not limited to, restrictions on excavation of the underlying soils for their gravel content. Any request for consent to disturb or use any untreated ground water underlying the Property must include water quality data and a human health and ecological risk evaluation.

Grantor will construct signs at the South Pond, North Pond, and wetland areas to notify the public that no swimming, fishing, or drinking of the waters is permitted. Grantee and successors must maintain the signs until the State of Colorado approves the removal of the notification signs. Grantor will continue to monitor the water quality of the ponds and, when the water quality meets State standards, request the State to approve removal of the notification signs.

Grantee shall not engage in any use of the surface expressions of ground water that might result in accidental consumption of the water, fish, or other aquatic species. This includes, but is not limited to, restrictions on fishing, swimming, activities that result in prolonged human contact with the water, hatchery operations for production of fish or other aquatic species for human consumption, and other recreational uses.

2. Building 12 Soil Contamination

Contamination: Grantor acknowledges that there is known contamination on the Property underlying the south end of Building 12 (see Exhibit D); and covenants to remain solely responsible for the complete decontamination of these conditions, as well as any later-discovered contamination. The contamination, believed to be the residue of a stockpile of uranium ores, poses a potential threat of radioactive exposure to individuals excavating the soils. There is no threat to persons occupying the building and conducting routine business activities, nor is there any indication the residual contamination is impacting the ground water.

Restriction: Grantee shall not, under any circumstances, without express written permission of CDPHE and the Grantor, engage in any activity that would result in the disturbance of soils or structures underlying the south end of Building 12. Grantor is required to remediate all contamination under and around Building 12 prior to termination of Grantor's lease of the building. Grantee accepts that the remediation will include demolition of Building 12 as the most cost-effective process to complete the remedial action and hereby agrees to accept this remediation approach. Grantor will not be responsible to rebuild the building or otherwise compensate the Grantee for the loss of the building.

3. Building 20 Soil Contamination

Contamination: Grantor acknowledges that there is known contamination on the Property beneath the southwest corner of Building 20 (see Exhibit D); and covenants to remain solely responsible for the complete decontamination of the soils. The contamination, believed to be from mill tailings used as fill material to raise the elevation of a pond bank prior to erection of the building, poses a potential threat to individuals excavating the soils from exposure to radioactive materials. There is no threat to persons occupying the building and conducting routine business activities, nor is there any indication the residual contamination is impacting the ground water.

Restriction: Grantee and its assigns shall not, under any circumstances, without express written permission of CDPHE and the Grantor, engage in any activity that would result in disturbance of soils or structures underlying the south end of Building 20. Prior to altering the structural integrity of the floor at the south end of Building 20, such permission must be obtained. When Grantor decides to vacate the building, Grantor will demolish the building and remediate contaminated materials beneath the building to within regulatory limits.

4. Foil Sources in Abandoned Well

Contamination: Grantee acknowledges that there is known contamination in the form of two foil radium sources encased in an abandoned well at the site (see Exhibit D for location). The well was abandoned in accordance with State of Colorado requirements and the sources were encased in the well with the approval of the state.

Restrictions: Grantee shall not engage in any activity that disturbs the seal on the well encasement or the well itself without the express written consent of CDPHE and the Grantor.

5. Enforceable Agreement

Grantor has entered into an enforceable agreement with CDPHE in accordance with State of Colorado Executive Order D.013.98 and CERCLA 120(h). The agreement establishes the Grantor's clean-up plans for the above (with the exception of C.4 [the well with radium foil sources]), reiterates the land use controls placed upon the Grantee and successors, specifies the monitoring of contaminated areas by the Grantor, and provides a funding mechanism for the Grantor to reimburse CDPHE for oversight activities.

6. Grantee's Responsibilities

Grantee is responsible for assuring that the restrictions and Grantor's rights of access related to the above and stated in this Agreement and in the Deed, are stated in the instrument of conveyance if Grantee passes ownership to another entity. Grantee is responsible for notifying Grantor's Long Term Surveillance and Maintenance Program of such transfer. Grantee acknowledges its landlord responsibilities to monitor tenants' activities to assure protection of Building 12 and 20 floors, to allow for safe soil excavation on the Property, to protect the abandoned well identified above, and to be protective of Grantee's remaining ground water monitoring wells.

Grantee acknowledges that planned use of the Property is for a mixture of commercial, industrial, office space, and open space, as stated in Grantee's reuse plan. Grantee's planned use is not restricted except as herein noted.